

CLAIMS

1. An apparatus for processing a substrate, comprising:
 - a first manifold module being configured to generate a fluid meniscus on a substrate surface; and
- 5 a second manifold module being configured to connect with the first manifold module and to move the first manifold module into proximity to the substrate surface to generate the fluid meniscus.
2. An apparatus for processing a substrate as recited in claim 1, further comprising:
 - a manifold carrier configured to move the first manifold module to a region of the substrate to be processed.
- 10 3. An apparatus for processing a substrate as recited in claim 1, wherein the connection is configured to supply fluids to the first manifold module and to remove fluids from the first manifold module.
- 15 4. An apparatus for processing a substrate as recited in claim 3, wherein the second manifold module is configured to supply a first fluid and a second fluid to the first manifold module and to remove the first fluid and the second fluid from the first manifold module.
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5. An apparatus for processing a substrate as recited in claim 4, wherein the first manifold module is configured to apply a first fluid and a second fluid to the substrate surface and to remove the first fluid and the second fluid from the substrate surface.

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6. An apparatus for processing a substrate as recited in claim 1, wherein the second manifold module is configured to move vertically to connect with the first manifold module.

10 7. An apparatus for processing a substrate as recited in claim 1, wherein the fluid meniscus conducts one of a plating, etching, drying, and cleaning operation.

15 8. An apparatus for processing a substrate as recited in claim 2, wherein a processing surface of the first manifold module is positioned beyond a plane of a bottom surface of the manifold carrier.

20 9. An apparatus for processing a substrate as recited in claim 8, wherein a processing surface of the first manifold module comprises a first conduit for applying a first fluid to the substrate surface, a second conduit for applying a second fluid to the substrate surface, and a third conduit for removing the first fluid and the second fluid from the substrate surface.

10. A method for processing a substrate, comprising:

positioning a first manifold module over a substrate surface of the substrate to be processed;

5 connecting a second manifold module to the first manifold module;

moving the second manifold module so the first manifold module is proximate to the substrate surface;

generating a fluid meniscus with the first manifold module, the first manifold module being supplied with fluids from the second manifold module; and

10 applying the fluid meniscus to the substrate surface to perform a wafer processing operation.

15 11. A method for processing a substrate as recited in claim 10, wherein the first manifold module includes a plurality of conduits configured to generate the fluid meniscus.

12. A method for processing a substrate as recited in claim 10, wherein positioning the first manifold module includes moving a manifold carrier with the first manifold module in position so the second manifold module is capable of connecting with the first module.

20 13. A method for processing a substrate as recited in claim 10, wherein connecting the second manifold module to the first manifold module includes coupling

ports of the first manifold module to ports of the second manifold module to facilitate fluid transfer between the first manifold module and the second manifold module.

14. A method for processing a substrate as recited in claim 10, wherein
5 moving the second manifold module so the first manifold module is proximate to the substrate surface includes moving the second manifold module vertically onto the first manifold module.

15. A method for processing a substrate as recited in claim 10, wherein
10 generating the fluid meniscus includes transferring a first fluid and a second fluid from the second manifold to the first manifold and removing the first fluid and the second fluid that has been applied to the substrate from the first manifold to the second manifold.

16. A method for processing a substrate as recited in claim 10, wherein the
15 wafer processing operation is one of a plating, etching, cleaning, and drying operation.

17. An apparatus for processing a substrate, comprising:
a first manifold module having a processing face with a first conduit configured to apply a first fluid to a substrate surface, a second conduit for applying a second fluid to the substrate surface, and a third conduit for removing the first fluid and the second fluid from the substrate surface, the applying and the removing generating a fluid meniscus on the substrate surface; and
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a second manifold module being configured to move the first manifold module proximate to the substrate surface and to deliver the first fluid and the second fluid to the first manifold module and to remove the first fluid and the second fluid that has been applied to the substrate from the first manifold module.

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18. An apparatus for processing a substrate as recited in claim 17, wherein the second manifold has ports for delivering the first fluid and the second fluid to the first manifold, and the second manifold has at least one port for removing the first fluid and the second fluid that has been applied to the substrate from the first manifold.

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19. An apparatus for processing a substrate as recited in claim 17, wherein the first manifold has ports for receiving the first fluid and the second fluid from the second manifold, and the first manifold has at least one port for delivering the first fluid and the second fluid that has been applied to the substrate to the second manifold module.

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20. An apparatus for processing a substrate as recited in claim 17, wherein the first fluid is one of an etching fluid, a cleaning fluid, a drying fluid, and a plating fluid, and the second fluid is configured to reduce surface tension of the first fluid.